



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Michael R. Durling et al.	Docket:	18496
Serial No.:	Unassigned 0993774	Examiner:	Unassigned
Filed:	Pending	Art Unit:	Unassigned
For:	DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE	Dated:	December 20, 2005

Mail Stop Petition
Commissioner or Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION UNDER 37 C.F.R. § 1.10(e)

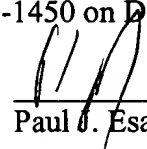
Sir:

This petition is filed under 37 C.F.R. § 1.10(e), requesting that the patent application mailed by Express Mail to the USPTO on 27 October 2005, pursuant to 37 C.F.R. § 1.10(a), and not received by the USPTO, be accorded a filing date of its mailing. No fee is due for this petition. The facts and circumstances are as follows.

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 20, 2005.

Dated: December 20, 2005



Paul J. Esatto, Jr.

BEST AVAILABLE COPY

On Wednesday 14 December 2005 Applicant's undersigned representative first became aware that the USPTO has no evidence of receipt of the subject patent application. Therefore, this petition is timely. 37 C.F.R. § 1.10(e)(1)

The subject patent application was filed by Express Mail on 27 October 2005. Attached hereto as Exhibit A is a true and correct copy of the patent application as filed on 27 October 2005. That application includes a certificate of mailing by Express Mail, pursuant to 37 C.F.R. § 1.10, including the Express Mail label number which was placed on the certificate of mailing prior to the original mailing by Express Mail. 37 C.F.R. § 1.10(e)(2)

Exhibit A comprises a copy of the originally filed patent application papers, including the certificate of mailing by Express Mail bearing the number of the Express Mail label thereon. Attached hereto as evidence of the mailing are the following: (1) Exhibit B, a verified statement by Paul J. Esatto, Jr., Senior Partner of Scully Scott Murphy & Presser, and the practitioner who signed the certificate of mailing in the instant application, attesting to the date of mailing and the customary mailing practices for new patent application in the office; Exhibit C, a verified statement by Jennifer A. Moses, the administrative assistant who attended to the formalities of the patent application; and Exhibit D, a verified statement by Michelle Mustafa, Docketing department manager, attesting to the mailing of the subject patent application; Exhibits E and F, as described in the statement of Ms. Mustafa. 37 C.F.R. § 1.10(e)(3)

The U.S. Postal Service has no record of receiving or delivering a package under the label number as cited in the Certificate of Mailing. Attached hereto as exhibit G is a copy of the tracking result obtained from USPS.com for the Express Mail label number copied from the Certificate of Mailing. The USPTO Office of Initial Patent Examination reports no record of receiving an Express Mail package under the label number cited in the Certificate of Mailing.

Furthermore, checks enclosed with the subject patent application for the payment of filing and assignment recordal fees have not been cashed.

In light of the facts set forth in the attached Exhibits, Applicant respectfully submits that sufficient evidence exists to establish that the subject patent application was filed by Express Mail pursuant to 37 C.F.R. § 1.10 on 27 October 2005. Specifically, the evidence includes a Certificate of Express Mail dated 27 October 2005 including the label number of the Express mail envelope in which the patent application was mailed. Despite the absence of an Express Mail label showing a date-in of 27 October 2005 corresponding to the Express Mail label number recorded on the Certificate of Mailing, 37 C.F.R. § 1.10(e)(3) permits evidence of mailing date by a showing as described in 37 C.F.R. § 1.10(d)(3). Section 1.10(d)(3) permits a showing of the actual mailing date with corroborating evidence that came into being within one business day of the deposit as Express Mail. In this case, that evidence includes the statement of Ms. Mustafa, Exhibit D. The corroborating evidence is the Express Mail log kept by Ms. Mustafa and the Docketing department as described in her statement, a copy of the relevant portion of which is attached as Exhibit F. 37 C.F.R. § 1.10(e)(4)

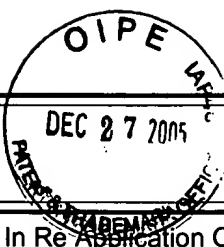
In light of the foregoing, Applicant respectfully requests that the subject application be received and afforded a filing date of 27 October 2005, the date of its mailing by Express Mail.

Respectfully Submitted,



Paul J. Esatto, Jr.
Registration No. 52,652

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza - Suite 300
Garden City, New York 11530
(516) 742-4343 (telephone)
PJE:ar



DEC 27 2005

TRANSMITTAL LETTER
(General - Patent Pending)Docket No.
18496

In Re Application Of: Michael R. Durling et al.

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
Unassigned	Pending	Unassigned	23389	Unassigned	Unassigned

Title: **DIFFERENTIAL TEMPERATURE ENERGY HARVESTING
IN A FUEL CELL POWERED UNDERWATER VEHICLE**COMMISSIONER FOR PATENTS:

Transmitted herewith is:

Petition Under 37 C.F.R. 1.10
Exhibits A -G

in the above identified application.

- ☒ No additional fee is required.
- ☐ A check in the amount of _____ is attached.
- ☒ The Director is hereby authorized to charge and credit Deposit Account No. **19-1013/SSMP** as described below.
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Dated: December 20, 2005

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December 20, 2005

(Date)

Signature of Person Mailing Correspondence

Paul J. Esatto, Jr.

*Typed or Printed Name of Person Mailing Correspondence*PJE:ar
cc:

DEC 27 2005

**TRANSMITTAL LETTER
(General - Patent Pending)**

Docket No.
18496

In Re App. No. Of: Michael R. Durling et al.

Application No. Unassigned	Filing Date Pending	Examiner Unassigned	Customer No. 23389	Group Art Unit Unassigned	Confirmation No. Unassigned
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Title: **DIFFERENTIAL TEMPERATURE ENERGY HARVESTING
IN A FUEL CELL POWERED UNDERWATER VEHICLE**

COMMISSIONER FOR PATENTS:

Transmitted herewith is:

**Petition Under 37 C.F.R. 1.10
Exhibits A -G**

in the above identified application.

- ☒ No additional fee is required.
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Signature

Dated: **December 20, 2005**

**Paul J. Esatto, Jr.
Registration No. 30,749
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Garden City, New York 11530
(516) 742-4343 (telephone)
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December 20, 2005

(Date)


Signature of Person Mailing Correspondence

Paul J. Esatto, Jr.

Typed or Printed Name of Person Mailing Correspondence

PJE:ar
cc:

PATENT OFFICE DATE STAMP WILL ACKNOWLEDGE RECEIPT OF:

1. Utility Patent Application Transmittal (in duplicate)
2. New Patent Application (15 pages of specification including claims and abstract)
3. One (1) Sheet of Formal Drawings
4. Executed Declaration and Power of Attorney
5. Assignment from inventor to GE with Recordation Cover Sheet and Check for \$40.00; Assignment from GE to Lockheed Martin with Recordation Cover Sheet and Check for \$40.00
6. Check for \$1,000 for filing fee
7. Express Certificate of Mailing #EV717621793US

Applicants: Michael Richard Durling et al.

For: DIFFERENTIAL TEMPERATURE ENERGY HARVESTING...

Docket: 18496

Dated: October 27, 2005

PJE:DJT:rd/jam



SCULLY, SCOTT, MURPHY & PRESSER
A PROFESSIONAL CORPORATION
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GARDEN CITY, NEW YORK 11530-0299

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Linda A. Hagemeier

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CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10) Applicant(s): Michael Richard Durling et al.	Docket No. 18496
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Application No. Unassigned	Filing Date Herewith	Examiner Unassigned	Customer No. 23389	Group Art Unit Unassigned
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Invention: **DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE**

I hereby certify that the following correspondence:

New U.S. Patent Application

(Identify type of correspondence)

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on

October 27, 2005

(Date)

Paul J. Esatto, Jr.

(Typed or Printed Name of Person Mailing Correspondence)


(Signature of Person Mailing Correspondence)

EY717621793US

("Express Mail" Mailing Label Number)

Note: Each paper must have its own certificate of mailing.

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.

18496

Total Pages in this Submission

4

COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, VA 22313-1450

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE

and invented by:

Michael Richard Durling et al.

If a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 15 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☐ Cross References to Related Applications (if applicable)
 - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☐ Reference to Sequence Listing, a Table, or a Computer Program Listing Appendix
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.

18496

Total Pages in this Submission

4

Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
- a. ☒ Formal Number of Sheets 1
- b. ☐ Informal Number of Sheets _____
4. ☒ Oath or Declaration
- a. ☒ Newly executed *(original or copy)* ☐ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under
Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby
incorporated by reference therein.
6. ☐ CD ROM or CD-R in duplicate, large table or Computer Program (Appendix)
7. ☐ Application Data Sheet (See 37 CFR 1.76)
8. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
- a. ☐ Computer Readable Form (CRF)
- b. ☐ Specification Sequence Listing on:
- i. ☐ CD-ROM or CD-R (2 copies); or
- ii. ☐ Paper
- c. ☐ Statement(s) Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

9. ☒ Assignment Papers *(cover sheet & document(s))*
10. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*
11. ☐ English Translation Document *(if applicable)*
12. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail *(Specify Label No.):* EV717621793US

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.

18496

Total Pages in this Submission

4

Accompanying Application Parts (Continued)

17. ☒ Additional Enclosures *(please identify below)*:

Assignee: Lockheed Martin Corporation
Bethesda, Maryland

Request That Application Not Be Published Pursuant To 35 U.S.C. 122(b)(2)

18. ☐ Pursuant to 35 U.S.C. 122(b)(2), Applicant hereby requests that this patent application not be published pursuant to 35 U.S.C. 122(b)(1). Applicant hereby certifies that the invention disclosed in this application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication of applications 18 months after filing of the application.

Warning

An applicant who makes a request not to publish, but who subsequently files in a foreign country or under a multilateral international agreement specified in 35 U.S.C. 122(b)(2)(B)(i), must notify the Director of such filing not later than 45 days after the date of the filing of such foreign or international application. A failure of the applicant to provide such notice within the prescribed period shall result in the application being regarded as abandoned, unless it is shown to the satisfaction of the Director that the delay in submitting the notice was unintentional.

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
18496

Total Pages in this Submission
4

Fee Calculation and Transmittal

CLAIMS AS FILED						
For	#Filed	#Allowed	#Extra	Rate		Fee
Total Claims	20	- 20 =	0	x	\$50.00	\$0.00
Indep. Claims	3	- 3 =	0	x	\$200.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>						\$0.00
Total # of Pages in Specification		15	Total # of Drawing Sheets		1	
Total # of Sheets	16	Application Size Fee				\$0.00
Basic Fee						\$300.00
Search Fee						\$500.00
Examination Fee						\$200.00
OTHER FEE (specify purpose)						\$0.00
TOTAL FILING FEE						\$1,000.00

- ☒ A check in the amount of \$1,000.00 to cover the filing fee is enclosed.
- ☒ The Director is hereby authorized to charge and credit Deposit Account No. 19-1013/SSMP as described below.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).


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Dated: October 27, 2005

Customer Number: 23389

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cc:



Signature
Paul J. Esatto, Jr.
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Differential Temperature Energy Harvesting in a Fuel Cell Powered Underwater Vehicle

Background of the Invention

Field of Invention

[0001] The present invention relates generally to the field of vehicle power plants, and more specifically to a fuel cell powered underwater vehicle having a differential temperature energy-harvesting device.

Description of Related Art

[0002] Fuel cell power plants are becoming more highly developed in the art and are preferable in part because of their low emissions characteristics. In addition, fuel cells operating on hydrogen and oxygen are a good choice for underwater vehicle power because they feature both a high energy density, measured as kilowatt-hours per liter of volume ($\text{kW}\cdot\text{hr}/\text{L}$), and high specific energy, measured as kilowatt-hours per kilogram ($\text{kW}\cdot\text{hr}/\text{kg}$). Either of these characteristics enable construction and operation of vehicles having the added flexibility of increased mission duration for a given store of energy, and/or achieving a

predetermined mission duration using a reduced energy storage requirement over alternative energy sources.

[0003] However, fuel cells have as a drawback the fact that they generate a significant amount of waste heat. For example, fuel cells typically operate at approximately 50% efficiency, which means that for every Watt of electrical power generated, they produce one Watt of waste heat. In order to operate in an underwater environment, it is necessary to dissipate this waste heat through a heat exchanger, which transfers the heat to the surrounding seawater. This heat energy is therefore lost to the environment.

Brief Summary of the Invention

[0004] In order to overcome this and other drawbacks, deficiencies and shortcomings in the prior art, provided according to the present invention is an apparatus for harvesting energy in a fuel cell powered vehicle having first and second energy harvesting elements with at least two ends, the first end being electrically insulated from and in thermal communication with a high temperature reservoir associated with the fuel cell, the second end being electrically insulated from and in thermal communication with a low temperature reservoir associated

with an exterior of the vehicle. In a preferred embodiment, the vehicle is a watercraft, specifically an underwater vehicle. The energy harvesting apparatus can include an electrical storage means for storing the energy harvested, and/or an electric load for consuming the energy harvested.

[0005] Also provided according to the present invention is a method for harvesting energy in a fuel cell powered vehicle comprising providing first and second energy harvesting elements having at least two ends, the first end being electrically insulated from and in thermal communication with a high temperature reservoir associated with the fuel cell, the second end being electrically insulated from and in thermal communication with a low temperature reservoir associated with an exterior of the vehicle, and directing an electrical voltage generated across the first and second energy harvesting elements to either an energy management system, electrical storage means, or electrical load.

Brief Description of the Drawings

[0006] These and other features, aspects and benefits of the present invention will be made apparent with reference to the following specification and accompanying drawings,

where like reference numerals refer to like features across the several views, and wherein:

[0007] Fig. 1 illustrates a schematic of a differential temperature energy harvesting in a fuel cell powered underwater vehicle according to the present invention.

Detailed Description of the Invention

[0008] Referring now to Fig. 1, shown in schematic form is the power plant section, generally 10, of an underwater vehicle having a differential temperature energy-harvesting unit, generally 12. Power plant section 10 has at its core a fuel cell 14, operative to produce electricity directly from hydrogen and oxygen. The specific type of fuel cell 14 will vary with the particular application, and may include, without limitation, Proton Exchange Membrane (PEM), Alkaline, or Solid Oxide types. Each type will have a particular operating temperature, which in turn will affect design considerations as will be shown, *infra*.

[0009] Power plant section 10 has a heat exchange loop 16 associated with fuel cell 14. A cooling medium is circulated through the heat exchange loop 16 in order to carry waste heat away from the fuel cell 14. Provided between an elevated temperature section 16a of the heat

exchange loop 16 and the surrounding seawater is the differential temperature thermoelectric energy harvesting unit 12, alternately referred to as a Seebeck unit, so named for Russian-German physicist Thomas Seebeck (1770-1831).

[0010] Energy harvesting unit 12 comprises one or more pairs (one in the exemplary embodiment) of dissimilar elements 12a, 12b, and both elements of the (one or more) pairs together spanning the distance between elevated temperature section 16a of heat exchange loop 16 and a low temperature reservoir 18. In a preferred embodiment, the elements 12a, 12b are comprised of materials considered semiconductors. In any case, the materials comprising each element 12a, 12b are selected to have a differential between the Seebeck coefficients of the two materials. One of the elements, 12a, will be a *p*-type leg, while the other, 12b, will be an *n*-type leg.

[0011] As examples, but in no way limiting the scope of the invention, material including lead telluride (PbTe), silver-antimony-germanium telluride (TAGS), and silicon germanium (SiGe) are frequently used in thermoelectric conversion. For example, telluride-based thermoelectric devices are advantageous when used in combination with

relatively lower-temperature fuel cell types, including PEM or Alkaline. Silicon germanium thermoelectric devices are advantageous when used in combination with relatively high temperature fuel cell, including a Solid Oxide type.

[0012] At each of the thermal extremes, the energy-harvesting unit 12 has electrical insulation 20a, 20b from the respective temperature reservoir. Under the influence of the of the temperature differential (ΔT) between the elevated temperature section 16a of heat exchange loop 16 and a low temperature reservoir 18, the metals will, according to the Seebeck effect, generate a voltage across the junction. This voltage may be captured via positive and negative nodes 24a and 24b, respectively, and directed to one or more of an energy management system 25, a storage means 26, including capacitive, solid state, chemical, battery, or other energy storage apparatus for later use, and/or directed to an internal or external electric load 28 associated with the vehicle.

[0013] In an alternative embodiment comprising a plurality of dissimilar pairs, these may be arranged electrically in series or in parallel as required according to the particular application. Moreover, the material forming either of the first and second energy harvesting elements

can include a dopant material, for example gallium phosphorous (GaP), to enhance the production of electric energy.

[0014] In yet another alternative embodiment, energy harvesting unit 12 comprises a thermocouple circuit, in which the junctions of two dissimilar metals are maintained at respectively high and low temperatures. Thereby, a voltage differential is produced between the two temperature reservoirs along either of the metals, which can be harvested.

[0015] In the exemplary embodiment low temperature reservoir 18 is the seawater surrounding the hull 22 of the underwater vessel. In most operational environments, it is expected that the temperature of the surrounding seawater will be significantly lower than that of the fuel cell 14 or the elevated temperature portion 16a of heat exchange loop 16. For example, a fuel cell 14 of the PEM type will operate at a temperature of approximately 60 degrees Celsius, while a fuel cell 14 of the solid oxide type will operate at a temperature of approximately 950 degrees Celsius. In comparison, the seawater temperature surrounding the underwater vessel can be expected to range between approximately 5 and 35 degrees Celsius. The energy

produced will be proportional to the temperature differential (ΔT) across the energy harvesting unit 12. Accordingly, fuel cell types which operate at a higher temperature will yield a greater level of output from energy harvesting unit 12.

[0016] The exemplary embodiment has been described with reference to an underwater vehicle. However, the present invention is equally applicable to surface watercraft, using the water in contact with the hull of the watercraft as a low temperature reservoir. Alternately, the present invention can be applied to surface vehicles designed to traverse land, water or either (e.g., ground-effect vehicles or hovercraft), where by operation of the fuel cell a sufficient temperature differential with the ambient environment can be expected in order to yield production of electrical energy in accordance with the present invention.

[0017] The present invention has been described with reference to certain exemplary embodiments. These embodiments are offered solely as illustrative, and not limiting, of the scope of the invention. Certain alterations and modifications will be apparent to those skilled in the art in light of the instant disclosure,

without departing from the scope of the invention, which is defined solely by the appended claims.

Claims

1. An apparatus for harvesting energy in a fuel cell powered vehicle comprising:

first and second energy harvesting elements, the first and second energy harvesting elements having a difference between their respective Seebeck coefficients, each of the first and second elements having at least two ends, the first ends being in thermal communication with a high temperature reservoir associated with the fuel cell, the second ends being in thermal communication with a low temperature reservoir associated with an exterior of the vehicle.

2. The apparatus according to claim 1, wherein the high temperature reservoir comprises a high temperature section of a heat exchange loop in thermal communication with the fuel cell.
3. The apparatus according to claim 1, wherein the vehicle is a watercraft, and the low temperature reservoir is water surrounding the watercraft.
4. The apparatus according to claim 3, wherein the watercraft is an underwater vehicle.

5. The apparatus according to claim 1 further comprising a plurality of pairs of said first and second energy harvesting elements.
6. The apparatus according to claim 5 wherein the plurality of pairs are in parallel electric communication with each other.
7. The apparatus according to claim 5 wherein the plurality of pairs are in series electric communication with each other.
8. The apparatus according to claim 1 wherein either or both first and second energy harvesting elements further comprises a dopant material.
9. The apparatus according to claim 1 wherein the fuel cell is selected from a group comprising Proton Exchange Membrane (PEM), Alkaline, and Solid Oxide type fuel cells.
10. The apparatus according to claim 1 further comprising an electrical storage means in electric communication with the first and second energy harvesting elements.

11. The apparatus according to claim 1 further comprising an electric load in electric communication with the first and second energy harvesting elements.
12. The apparatus according to claim 1 further comprising an energy management system in electric communication with the first and second energy harvesting elements.
13. The apparatus according to claim 1 wherein the first ends of the first and second energy harvesting elements are electrically insulated from the high temperature reservoir.
14. The apparatus according to claim 1 wherein the second ends of the first and second energy harvesting elements are electrically insulated from the low temperature reservoir.
15. A method for harvesting energy in a fuel cell powered vehicle comprising:
 - (a) providing first and second energy harvesting elements having a difference between their respective Seebeck coefficients, each element having at least two ends, the first ends being

in thermal communication with a high temperature reservoir associated with the fuel cell, the second ends being in thermal communication with a low temperature reservoir associated with an exterior of the vehicle; and

(b) directing an electrical voltage generated across the first and second energy harvesting elements to one or more of an energy management system, electrical storage means, or electric load.

16. The method according to claim 15, wherein the fuel cell powered vehicle comprises a watercraft.
17. The method according to claim 16, wherein the watercraft comprises an underwater vehicle.
18. The method according to claim 15, further comprising electrically insulating the first ends of the first and second energy harvesting elements from the high temperature reservoir.
19. The method according to claim 15, further comprising electrically insulating the second ends of the first and second energy harvesting elements from the low temperature reservoir.

20. A method for harvesting energy in a fuel cell powered vehicle having first and second energy harvesting elements, the first and second energy harvesting elements having at least two ends, the first ends being in thermal communication with the fuel cell, the second ends being in thermal communication with a low temperature reservoir, the method comprising:
- (a) energizing a high temperature reservoir with waste heat derived from the fuel cell; and
 - (b) directing an electrical voltage generated across the first and second energy harvesting elements to one or more of an energy management system, electrical storage means, or electric load.

Abstract

A method and apparatus for harvesting energy in a fuel cell powered vehicle has first and second energy harvesting elements with at least two ends, the first end being electrically insulated from and in thermal communication with a high temperature reservoir associated with the fuel cell, the second end being electrically insulated from and in thermal communication with a low temperature reservoir associated with an exterior of the vehicle. The apparatus has particular utility for use in watercraft, specifically an underwater vehicle. The energy harvesting apparatus can include an electrical storage means for storing the energy harvested, and/or an electric load for consuming the energy harvested.



DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE

Inventor: Michael Richard Durling et al.
Doctype: 10426

Docket: 18496

Sheet 1 of 1

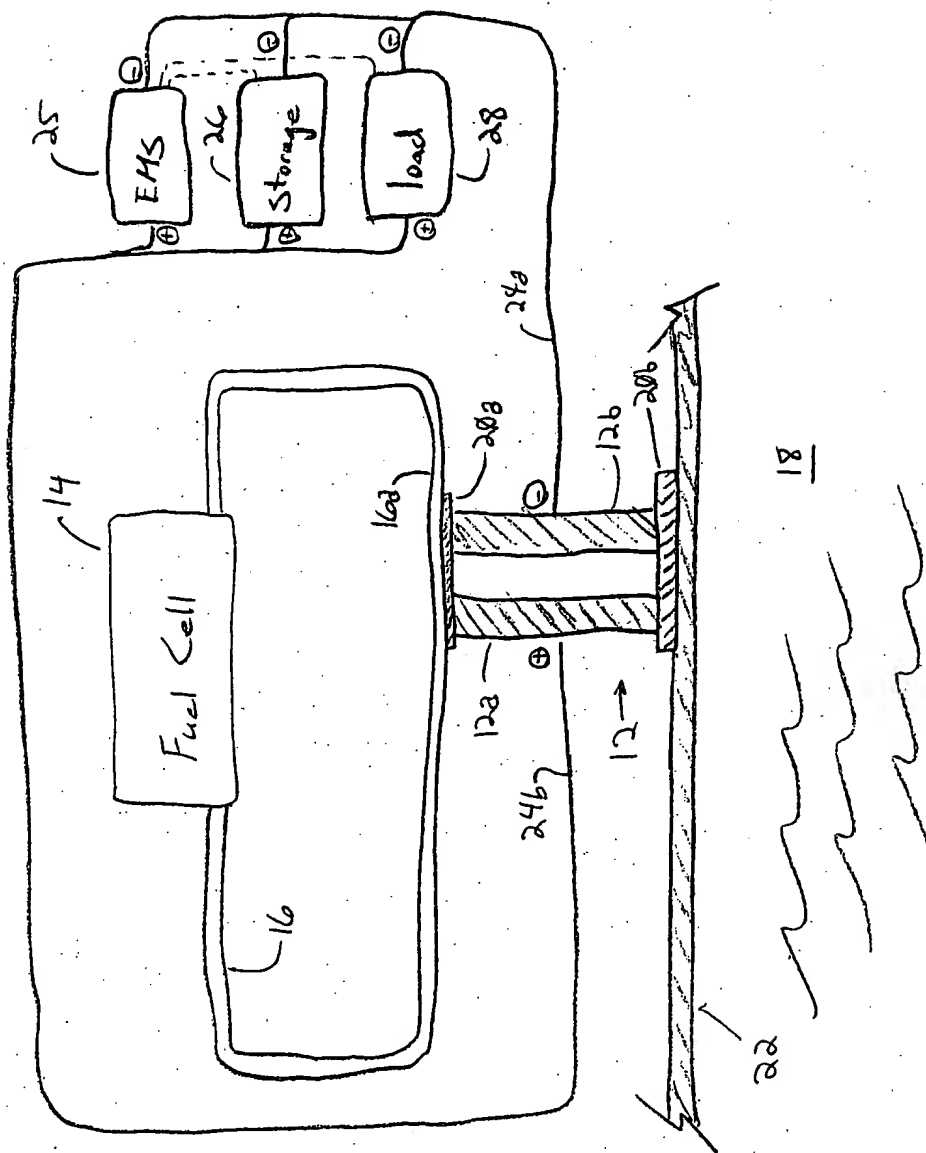


Fig. 1



GE 33036
(LM FE 00783)
DOCKET NO. 18496

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE

the specification of which

(check one)

☒ [x] is attached hereto.

☐ [] was filed on _____ as a United States Application No. or PCT International Application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37 Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 (a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Number	Country	Date of Filing Day/Month/Year	Priority Claimed Under 35 U.S.C. 119
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

(Application Number)

(Filing Date)

(Application Number)

(Filing Date)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35, United States Code, Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No.

Filing Date

Status

Application Serial No.

Filing Date

Status

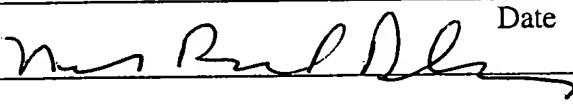
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

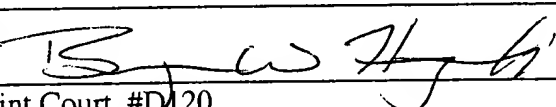
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

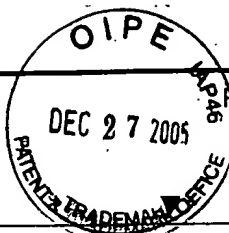
Customer No. 48288

Address all telephone calls to Paul J. Esatto, Jr. at telephone no. 516-742-4343

Address all correspondence to Paul J. Esatto, Jr., Scully, Scott, Murphy & Presser, 400 Garden City Plaza, Garden City, New York 11530

Full name of sole or first inventor: Michael Richard Durling		10/18/05
Sole or first inventor's signature 		Date
Residence:	13 Grey Fox Drive Moreau, New York 12828	
Citizenship:	USA	
Post Office Address: SAME AS RESIDENCE		

Full name of second inventor: Benjamin Walter Hojnacki		
Second inventor's signature 		Date 10/17/05
Residence	909 Shorepoint Court, #D120 Alameda, California 94501	
Citizenship:	USA	
Post Office Address: SAME AS RESIDENCE		



RECORDATION FORM COVER SHEET

PATENTS ONLY

Doc No.: 18496

U.S. DEPARTMENT OF COMMERCE

Patent and Trademark Office

Tab settings → → → ▼ ▼ ▼ ▼ ▼

To the Director of the United States Patent and Trademark Office: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies):

Michael Richard Durling - 10/18/2005

Benjamin Walter Hojnacki - 10/17/2005

Additional names(s) of conveying party(ies)

☐ Yes ☒ No

2. Name and address of receiving party(ies):

Name: General Electric Company

Address: 1 River Road

3. Nature of conveyance:

☒ Assignment

☐ Merger

☐ Security Agreement

☐ Change of Name

☐ Other

City: Schenectady State/Prov.: NY

Country: USA ZIP: 12345

Execution Date: 10/18/2005; 10/17/2005

Additional name(s) & address(es)

☐ Yes ☒ No

4. Application number(s) or patent numbers(s):

If this document is being filed together with a new application, the execution date of the application is: 10/18/2005; 10/17/2005

Patent Application No.

Filing date

B. Patent No.(s)

Additional numbers

☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Paul J. Esatto, Jr.

Registration No. 30,749

Address: SCULLY, SCOTT, MURPHY & PRESSER

400 Garden City Plaza, Ste. 300

City: Garden City State/Prov.: NY

Country: USA ZIP: 11530

6. Total number of applications and patents involved:

1

7. Total fee (37 CFR 3.41):.....\$ 40.00

☒ Enclosed - Any excess or insufficiency should be credited or debited to deposit account

☐ Authorized to be charged to deposit account

8. Deposit account number:

19-1013/SSMP

(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Paul J. Esatto, Jr.

Name of Person Signing

Signature

October 27, 2005

Date

4

Total number of pages including cover sheet, attachments, and document:

ASSIGNMENT

In accordance with obligations entered into pursuant to an Employee Innovation and Proprietary Information Agreement or other agreement and/or for other good and valuable consideration of which I/we acknowledge receipt, I/we,

MICHAEL RICHARD DURLING

of MOREAU, NEW YORK

BENJAMIN WALTER HOJNACKI

of ALAMEDA, CALIFORNIA

hereby sell and assign to **General Electric Company, a New York Corporation**, (hereinafter referred to as Assignee) having an address at 1 River Road, Schenectady, New York 12345, USA, its successors and assigns my (our) entire respective right(s), title(s) and interest(s) in and to the invention and improvements invented and originated by me/us and described in the application for United States Patent currently entitled:

**DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED
UNDERWATER VEHICLE**

☒ executed concurrently herewith,

☐ filed on having Serial Number

and any and all applications for patent and patents therefrom in any and all countries, including all divisions, continuations, reexaminations and reissues thereof, and all rights of priority resulting from the filing of said United States application, and authorize and request any official whose duty it is to issue patents, to issue any patent on said inventions and improvements resulting therefrom to said Assignee, or its successors or assigns and agree that on request and without further consideration, but at the expense of said Assignee, I/we will communicate to said Assignee or its representatives or nominees any facts known to me/us respecting said inventions and improvements and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuation, reexamination and reissue applications, make all rightful oaths and generally do everything possible to aid said Assignee, its successors, assigns, and nominees to obtain and enforce proper patent protection for said invention and its improvements in all countries:

INVENTOR 1

Signature: _____
MICHAEL RICHARD DURLING

Date: _____

Witnessed by: _____
Signature

Date: _____

Printed Name of Witness

Witnessed by: _____
Signature

Date: _____

Printed Name of Witness

SECTION BELOW IS FOR USE ONLY IF SIGNING IN THE PRESENCE OF A NOTARY

M R Durling
MICHAEL RICHARD DURLING

Date: 10/18/05

STATE OF NEW YORK
COUNTY OF SCHENECTADY

SS.

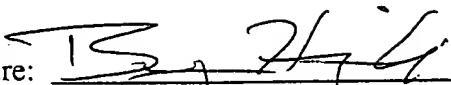
JOANNE A. SMITH
Notary Public in the State of New York
Qualified in Schenectady Co.
No. 01SM5068633
My Commission Expires Nov. 4, 2006

This 18th day of October 2005 before me personally came the above-named MICHAEL RICHARD DURLING, to me personally known as the individual who executed the foregoing assignment, who acknowledged to me that he/she executed the same of his/her own free will for the purposes therein set forth.


Seal

Joanne A. Smith
(Notary Public)

INVENTOR 2


Signature: 
BENJAMIN WALTER HOJNACKI

Date: 10/17/05

Witnessed by: 
Signature

Date: 10/17/05

Greg Concepcion
Printed Name of Witness

Witnessed by: 
Signature

Date: 10/17/05

Y.J.M. Mihara-Meer
Printed Name of Witness

SECTION BELOW IS FOR USE ONLY IF SIGNING IN THE PRESENCE OF A NOTARY

BENJAMIN WALTER HOJNACKI

Date: _____

STATE OF NEW YORK

ss.

COUNTY OF SCHENECTADY

This _____ day of _____, _____ before me personally came the above-named **BENJAMIN WALTER HOJNACKI**, to me personally known as the individual who executed the foregoing assignment, who acknowledged to me that he/she executed the same of his/her own free will for the purposes therein set forth.

Seal

(Notary Public)

RECORDATION FORM COVER SHEET

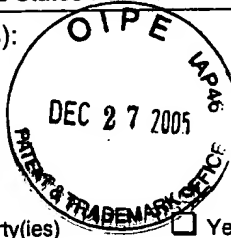
U.S. DEPARTMENT OF COMMERCE

Patent and Trademark Office

PATENTS ONLY

Tab settings → → → ▼ ▼ ▼ ▼ ▼ ▼ ▼

To the Director of the United States Patent and Trademark Office: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies):
General Electric CompanyAdditional names(s) of conveying party(ies) ☐ Yes ☒ No

2. Name and address of receiving party(ies):

Name: **Lockheed Martin Corporation**Address: **6801 Rockledge Drive**

3. Nature of conveyance:

- ☒ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Other _____

Execution Date: **October 18, 2005**City: **Bethesda** State/Prov.: **MD**Country: **USA** ZIP: **20817**Additional name(s) & address(es) ☐ Yes ☒ No

4. Application number(s) or patent numbers(s):

If this document is being filed together with a new application, the execution date of the application is: **10/18/2005; 10/17/2005**

Patent Application No. _____ Filing date _____

B. Patent No.(s) _____

BEST AVAILABLE COPY

Additional numbers _____

☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: **Paul J. Esatto, Jr.**Registration No. **30,749**Address: **SCULLY, SCOTT, MURPHY & PRESSER****400 Garden City Plaza, Ste. 300**City: **Garden City** State/Prov.: **NY**Country: **USA** ZIP: **11530**6. Total number of applications and patents involved: **1**7. Total fee (37 CFR 3.41):.....\$ **40.00**☒ Enclosed - Any excess or insufficiency should be credited or debited to deposit account☐ Authorized to be charged to deposit account

8. Deposit account number:

19-1013/SSMP

(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9. Statement and signature.

*To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.***Paul J. Esatto, Jr.**

Name of Person Signing

Signature

October 27, 2005

Date

Total number of pages including cover sheet, attachments, and document: **2**

ASSIGNMENT – UNITED STATES PATENT APPLICATIONS

GENERAL ELECTRIC COMPANY, a New York corporation ("GE"), for good and valuable consideration, the receipt of which is hereby acknowledged, hereby sells, assigns, transfers and sets over, to LOCKHEED MARTIN CORPORATION, a Maryland corporation ("LMC"), all the right, title and interest of GE in, to and under the United States patent application(s) (and the invention(s) claimed thereby) set forth below:

<u>Docket #</u>	<u>Title</u>
33036	DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE

and executed and assigned to GE by the inventor(s):

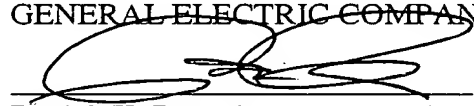
MICHAEL RICHARD DURLING on October 18, 2005

BENJAMIN WALTER HOJNACKI on October 17, 2005

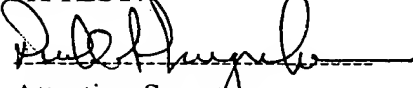
including any and all applications for patent and patents therefrom in any and all countries, including all divisions, continuations, reexaminations and reissues thereof, and all rights of priority resulting from the filing of said United States application, and the right to sue and recover damages for infringement thereof, the same to be held and enjoyed by LOCKHEED MARTIN CORPORATION for its own use and for its successors and assigns to the full end of the terms of the listed patent application(s) and any other patent application(s) or patent(s) which may result from the listed patent application(s) as fully and entirely as the same would have been held and enjoyed by GE if this assignment had not been made.

GE has caused its corporate seal to be affixed and this Assignment to be executed by its duly authorized representative this 18 day of October, 2005.

GENERAL ELECTRIC COMPANY


Patrick K. Patnode
Supervisory Patent Counsel
GE Global Research

ATTEST:


Attesting Secretary

BEST AVAILABLE COPY

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Michael R. Durling et al.	Docket:	18496
Serial No.:	Unassigned	Examiner:	Unassigned
Filed:	Pending	Art Unit:	Unassigned
For:	DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE	Dated:	December 20, 2005

Mail Stop Petition
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT OF PAUL J. ESATTO, JR.

I, Paul J. Esatto, Jr., hereby state as follows:

1. I am the senior partner with the law firm of Scully Scott Murphy and Presser, attorneys for the Applicants in the above-captioned patent application;
2. I have reviewed the petition to which the statement is an exhibit;
3. On 27 October 2005, I reviewed a new patent application prepared under our Attorney Docket Number 18496, including a dispatch sheet detailing the contents of the filing and having the Express Mail label number for the filing, corresponding to the Express Mail label number on the Certificate of Mailing;
4. I reviewed and signed the transmittal forms and a certificate of mailing by Express Mail accompanying the new patent application;
5. I dispatched the signed new application for mailing to the USPTO according to the customary and routine procedures for our office;
6. It is the customary and routine practice of this office in filing new patent applications that following attorney signature, copies are made for the client's files and for the internal files; After the copies are made, the application is

delivered to the Docketing department; The Docketing department makes a contemporaneous record of the Express Mail filing, seals the new application papers in an Express Mail envelope, applies the express mail label having the number corresponding to the certificate of mailing, addressed to the USPTO and having sufficient postage, and deposits the sealed, labeled Express Mail envelope in an Express Mail drop box located in the common lobby of the building where the firm maintains its offices prior to the last scheduled pickup of the day for that box, in this case 5:00 PM;

7. To the best of my knowledge, the above procedures were carried out as described with respect to the subject application;
8. All statements made herein on knowledge are true, and all statements made herein on belief are believed to be true, and I make such statements with the knowledge that the materially false statements and the like so made may jeopardize the validity and enforceability of the instant patent application or any patent issued thereon, and are punishable under 18 U.S.C. § 1001 by fine, imprisonment or both.

Respectfully,

A handwritten signature in black ink, appearing to read 'P. Esatto, Jr.', with a stylized, cursive script.

Paul J. Esatto, Jr.

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza - Suite 300
Garden City, New York 11530
(516) 742-4343 (telephone)
PJE:ar



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Michael R. Durling et al.	Docket:	18496
Serial No.:	Unassigned	Examiner:	Unassigned
Filed:	Pending	Art Unit:	Unassigned
For:	DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE	Dated:	December 20, 2005

Mail Stop Petition
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT OF JENNIFER A. MOSES

I, Jennifer A. Moses, hereby state as follows

1. I am an administrative assistant for the law firm of Scully Scott Murphy & Presser.
2. I have reviewed the petition to which the statement is an exhibit;
3. On 27 October 2005, I prepared transmittal and other formality papers in a new patent application prepared under Attorney Docket Number 18496 for signature by Mr. Paul J. Esatto, Jr. I also prepared a dispatch sheet detailing the contents of the filing and having the Express Mail label number for the filing, corresponding to the Express Mail label number on the Certificate of Mailing.
4. After the papers were signed by Mr. Esatto, I made copies of all papers for the client's files and for the internal files. After making the copies, I delivered the original signed new application papers to the Docketing department for mailing to the USPTO. I also delivered to the Docketing department, together with the new application papers, the aforementioned dispatch sheet, and a note for entry into the Express Mail log, the note containing the Attorney Docket

Number, the nature of the filing, the date of the filing, and the Express Mail Label number.

5. All statements made herein on knowledge are true, and all statements made herein on belief are believed to be true, and I make such statements with the knowledge that the materially false statements and the like so made may jeopardize the validity and enforceability of the instant patent application or any patent issued thereon, and are punishable under 18 U.S.C. § 1001 by fine, imprisonment or both.

Respectfully,

A handwritten signature in cursive script, appearing to read "Jennifer A. Moses".

Jennifer A. Moses

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza - Suite 300
Garden City, New York 11530
(516) 742-4343 (telephone)



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Michael R. Durling et al.	Docket:	18496
Serial No.:	Unassigned	Examiner:	Unassigned
Filed:	Pending	Art Unit:	Unassigned
For:	DIFFERENTIAL TEMPERATURE ENERGY HARVESTING IN A FUEL CELL POWERED UNDERWATER VEHICLE	Dated:	December 20, 2005

Mail Stop Petition
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT OF MICHELLE MUSTAFA

I, Michelle Mustafa, hereby state as follows:

1. I am the Docketing department manager for the law firm of Scully Scott Murphy & Presser, and I have worked for the firm and in the Docketing department thereof for over 11 years;
2. I have reviewed the petition to which the statement is an exhibit;
3. On 27 October 2005, I received from Jennifer A. Moses, signed new application papers prepared under Attorney Docket Number 18496 for mailing the USPTO by Express Mail;
4. I also received from Ms. Moses, together with the signed new application papers, a dispatch sheet detailing the contents of the filing and having the Express Mail label number for the filing, corresponding to the Express Mail label number on the Certificate of Mailing in the filing;
5. I also received from Ms. Moses, together with the new application papers, a note for entry into the Express Mail log, the note containing the Attorney Docket

Number, the nature of the filing, the date of the filing, and the Express Mail Label number;

6. I entered the note in to the Express Mail log book kept for that purpose;
7. Attached to the foregoing petition as Exhibits E and F are true and correct copies of the aforementioned dispatch sheet, and the relevant page of the aforementioned Express Mail log book, respectively.
8. Pursuant to the routine and customary practice of the Docketing department, I sealed the new application papers in an Express Mail envelope, and applied the Express Mail label having the number corresponding to the Certificate of Mailing, addressed to the USPTO and having sufficient postage;
9. I deposited the Express Mail envelope in an Express Mail drop box located in the common lobby of the building where the firm maintains its offices, prior to the last scheduled pickup of the day for that box, in this case 5:00 PM; and
10. All statements made herein on knowledge are true, and all statements made herein on belief are believed to be true, and I make such statements with the knowledge that the materially false statements and the like so made may jeopardize the validity and enforceability of the instant patent application or any patent issued thereon, and are punishable under 18 U.S.C. § 1001 by fine, imprisonment or both.

Respectfully,

Michelle Mustafa

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza - Suite 300
Garden City, New York 11530
(516) 742-4343 (telephone)



U.S. PATENT APPLICATION DISPATCH SHEET

Patenting Department

FROM: Jennifer Moses

10/27/05 The following communication (s) was sent to the U.S. Patent and Trademark Office on _____.

☒ New Patent Application with transmittal in duplicate
_____ Divisional _____ Continuation _____ CPA _____ CIP

_____ New Provisional Patent Application with transmittal in duplicate

_____ Amendment with transmittal in duplicate

_____ Preliminary Amendment with transmittal in duplicate

_____ Information Disclosure Statement with PTO-1449 and copies of cited references

_____ Petition for Extension of Time _____ 1 month _____ 2 months _____ 3 months _____
_____ 4 months _____ 5 months

_____ Notice of Appeal in duplicate/or Brief on Appeal in triplicate (circle one)

☒ Executed Assignment with Recordal Cover Sheet in duplicate ; \$40 check (2)

_____ Response to Notice to File Missing Parts with executed Declaration

_____ Sequence Listing, Verification, Copy of Notice to Comply, Response to Notice to Comply, Computer Disk w/ Sequence in ASCII

_____ Issue Fee Transmittal in duplicate

☒ Transmittal of Formal Drawings (Figures 1 , # of sheets 1)

_____ Deposit Account No. charged _____ Amount Being Charged \$ _____

☒ Check in the amount of \$ 1,000

☒ Certificate of Mailing _____ first class EU71762179345 Express

Other: Declaration / POA

Client No: 1323 Client Name: Lockheed Martin

Serial No: _____ Docket No.: 18496 Due Date: _____

Attorney Preparing Paper: DJT Attorney Signing Paper: PSG (14)

New App. 10/26/05

D# 19270 JAM

EU 717621802US

EV 717621802US

New App/n.

10/26/05

Shae

EV 717621215US

New App. 10/25/05

D# 19243 JAM

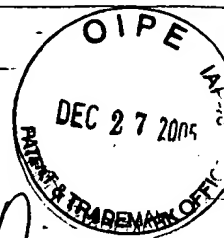
EU 717621816US

New App. D# 18496

10/27/05 JAM

EU 717621793US

AVAILABLE COPY





U.S. PATENT APPLICATION DISPATCH SHEET

TO: Docketing Department

FROM: CHRISTINE L.

The following communication (s) was sent to the U.S. Patent and Trademark Office on

DECEMBER 20, 2005

- ☐ New Patent Application with transmittal in duplicate
☐ Divisional ☐ Continuation ☐ CPA ☐ CIP
- ☐ New Provisional Patent Application with transmittal in duplicate
- ☒ Amendment with transmittal in duplicate
- ☐ Preliminary Amendment with transmittal in duplicate
- ☐ Information Disclosure Statement with PTO-1449 and copies of cited references
- ☐ Petition for Extension of Time ☐ 1 month ☐ 2 months ☐ 3 months ☐
☐ 4 months ☐ 5 months
- ☐ Notice of Appeal in duplicate/or Brief on Appeal in triplicate (circle one)
- ☐ Executed Assignment with Recordal Cover Sheet in duplicate
- ☐ Response to Notice to File Missing Parts with executed Declaration
- ☐ Sequence Listing, Verification, Copy of Notice to Comply, Response to Notice to Comply, Computer Disk w/ Sequence in ASCII
- ☐ Issue Fee Transmittal in duplicate
- ☐ Transmittal of Formal Drawings (Figures , # of sheets)
- ☐ Deposit Account No. charged Amount Being Charged \$
- ☐ Check in the amount of \$
- ☐ Certificate of Mailing ☐ first class ☐ Express

Other:

Client No: 1233 Client Name: CABINET ORES

Serial No: 09/937,794 Docket No.: 14926 Due Date: DECEMBER 20, 2005

Attorney Preparing Paper: EWG Attorney Signing Paper: EWG

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